

NON-PUBLIC?: N  
ACCESSION #: 8812010153  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Crystal River Unit 3 PAGE: 1 of 3

DOCKET NUMBER: 05000302

TITLE: Increased Turbine Control Setting Causes Excessive Steam Pressure  
Decrease Resulting in Reactor Trip  
EVENT DATE: 10/28/88 LER #: 88-024-00 REPORT DATE: 11/28/88

OPERATING MODE: 1 POWER LEVEL: 021

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
NAME: L. W. Moffatt, Nuclear Safety Supervisor  
TELEPHONE  
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SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT: Crystal River Unit 3 (CR-3) was in Mode 1, Power Operation, during the early morning hours of October 28, 1988. The reactor was producing 21% full power. Operators were preparing to close the generator output breakers. At 0328, output breakers were closed. Forty-four seconds after breaker closure, the reactor tripped.

Reactor trip ultimately resulted from an increased control setting for the Main Turbine Governor Valves (GV's). The increased setting caused steam pressure to decrease more than expected, resulting in Main Steam and Main Feedwater isolation. As designed, Main Feedwater Pumps (MFWP's) tripped as part of the isolation. The Reactor Protection System tripped the reactor due to loss of MFWP's at greater than 20% full power.

The GV position limit setting was reduced before restart following the trip. Operating procedures have been revised to include instructions regarding steam header pressure decrease following output breaker closure, and actions to be taken if pressure drops excessively.

(End of Abstract)

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## EVENT DESCRIPTION

Crystal River Unit 3 (CR-3) was in Mode 1, Power Operation, during the early morning hours of October 28, 1988. The Reactor (AC) was critical, and producing 21% of rated thermal power. The Main Turbine (TA,TRB) was spinning, but the electric generator (EL,TG) was not on line. Heat produced by the reactor was being rejected to the main condenser (SG,COND) via the turbine bypass valves (SB,PCV). All Integrated Control System (JA) (ICS) control stations were in automatic control except the Main Feedwater Pumps (SJ,P), Control Rods (AA,ROD), and the Main Turbine. Operators closed one Generator Output Breaker (EL,BKR) at 0328. Forty-four seconds after breaker closure, the reactor tripped.

The Electro-Hydraulic Control system (TG) (EHC), which controls the main turbine, includes a minimum position limit for the Turbine Governor Valves (TA,FCV) (GV's). This limit establishes the initial GV position and initial load on the main electric generator when output breakers are closed. At the time of the reactor trip, the GV position limit was set such that the generator would initially load to approximately 135 MWe following output breaker (EL,BKR) closure.

At 0328, operators closed generator output breaker number 1662, GV's opened to their preset initial position, and the generator loaded to approximately 135 MWe. Operators received a "Low Steam Flow" alarm following output breaker closure. They then increased generator demand in order to increase steam flow, and clear the alarm.

It is common for operators to receive the "Low Steam Flow" alarm following output breaker closure. Once the alarm is received, the turbine will trip if the alarm does not clear within sixty seconds. Therefore, operators are directed by procedure to increase generator load immediately following output breaker closure.

Steam header (SB) pressure and Steam Generator (AB,SG) pressures began decreasing following breaker closure. Decreased pressures resulted from decreased back pressure, due to GV's opening, and increased steam flow. Usually, header pressure does not decrease more than 100 psig. However, in this event pressure decreased faster and farther than expected. Forty one seconds after output breaker closure, steam generator pressure decreased from 894 to 616 psig. At this point, the Emergency Feedwater Initiation and Control system (BA) (EFIC) isolated Main Steam (SB) (MS) and Main Feedwater (SJ) (FW) for both Steam Generators. As designed, the EFIC system tripped both Main Feedwater pumps (MFWP's) as part of the FW isolation actuation. Within three seconds of the MS and FW isolation actuation, the Reactor Protection System (JC) (RPS) tripped the reactor due to loss of both MFWP's

at greater than 20% of full power.

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## CAUSE

The root cause of the trip was the Governor Valve position limit setting. In the past, the limit was set such that the generator would initially load to 50 MWe when output breakers closed. However, on January 10, 1988, the setting was increased to the value that existed on 10/28/88. The setting was increased in an effort to eliminate the need for operators to increase steam flow to clear the "Low Steam Flow" alarm following generator output breaker closure. Steam pressure decreased farther and more rapidly than expected following breaker closure due to the unexpected increased GV position, and increased steam flow.

## EVENT ANALYSIS

The EHC system performed as designed, given the GV position limit setting at the time of the trip. The EFIC and RPS systems also functioned as designed when their actuation/trip setpoints were challenged.

Following the reactor trip, the reactor was subcritical with all Safety and Regulating Control Rods fully inserted. All plant parameters remained within their expected range of values. Thus, the event did not threaten the health and safety of the general public.

## CORRECTIVE ACTIONS

The GV position limit setting was reduced to a value corresponding to approximately 80 MWe before restart following the trip. The setting will be returned to the original setting which corresponds to a 50 MWe output.

Operating procedures have been revised to include instructions regarding steam header pressure decrease following output breaker closure, and actions to be taken if pressure drops excessively.

## PREVIOUS SIMILAR EVENTS

Numerous reactor trips have occurred at CR-3. This was the first trip caused by excessive steam pressure decrease following output breaker closure.

ATTACHMENT # 1 TO ANO # 8812010153 PAGE: 1 of 1

Florida Power Corporation

November 28, 1988  
3F1188-16

U.S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, D.C. 20555

Subject: Crystal River Unit 3  
Docket No. 50-302  
Operating License No. DPR-72  
Licensee Event Report No. 88-024-00

Dear Sir:

Enclosed is Licensee Event Report (LER) 88-024-00 which is submitted in accordance with 10 CFR 50.73.

Should there be any questions, please contact this office.

Yours very truly,  
/s/ KEN WILSON  
Kenneth R. Wilson  
Manager, Nuclear Licensing

WLR:mag  
Enclosure  
xc: Regional Administrator, Region II  
Senior Resident Inspector

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